REMARKS / ARGUMENTS

Claims 21-38 remain pending in this application. No claims have been canceled or added.

35 U.S.C. §112

The claims have been amended to recite that the grain size of the eutectic carbide is less than 30 μm in order to overcome the Examiner's rejection.

Furthermore, with respect to the Examiner's comment that the grain size of the eutectic carbide with respect to Ni and Fe base alloys is not supported in the specification, Applicants respond as follows. In the specification, the Co base alloy is discussed as an example for purposes of explanation. As mentioned on page 29, line 21 to page 30, line 6 of the specification, hot plastic forming can be applied to other alloys such as a Ni base alloy and an Fe base alloy. Therefore, it follows that such alloys can have the feature of a eutectic carbide less than 30 μm as with the Co base alloy.

35 U.S.C. §103

Claims 25, 26, 31, 32, 37 and 38 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ohriner et al (U.S. Patent No. 4,803,045). Claims 21, 22, 27, 28, 33 and 34 stand rejected under 35 U.S.C. §103(a) as being unpatentable

over Nakamura et al (U.S. Patent No. 4,789,412). Further, claims 23, 24, 29, 30, 35, and 36 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Dong et al (U.S. Patent No. 4,911,768). These rejections are traversed as follows.

The present invention is directed to a corrosion-resisting and wear-resisting member that slides over another member. The corrosion-resisting member is produced through a "hot plastic forming" method applied under specific conditions. Thus, the eutectic carbide is formed in the form of grains or clusters of the specified size and providing the attending advantages. This invention is an improvement over the invention disclosed in U.S. Patent No. 6,672,330 (which is commonly assigned and has overlapping inventorship and was submitted in an IDS filed August 12, 2003 as U. S. Pub. No. 2001/0017906). One improvement over this patent is the defining of the Vickers hardness of the corrosion-resisting and wear-resisting member to a specific range. With such hardness, the member enhances its wear-resistance while reducing the damage inflicted on the other member. In particular, this specific hardness provides the alloy with a specific value of friction coefficient such that the advantages of the present invention can be realized.

The presently claimed invention states that the corrosion-resisting and wear-resisting member slides over another member. The corrosion-resisting and wear-resisting member being a Co base alloy, a Ni base alloy or an Fe base alloy. The eutectic carbide used in this sliding member is discontinuously distributed in the form of grains or clusters. This type of distribution provides the sliding member with a

friction of coefficient as low as 0.1 - 0.5. This makes the sliding member resistant to abrasion and reduces the occurrence of detaching of the base material from the member resulting from the abrasion. If abrasion leaves a projection of eutectic carbide, the detaching of this projected eutectic carbide cause by breaking, etc., does not occur. The presence of the eutectic carbide in its present form provides the member with strong erosion resistance thereby providing high wear-resistance.

Furthermore, by making the grain size of the eutectic carbide less than 30 μm, the member has a high impact value or high toughness. This high toughness reduces the occurrence of detaching of a base material or the eutectic carbide due to abrasion, thereby also contributing to high wear-resistance. Other notable effects, including a low coefficient of friction is realized because of the discontinuously distributed eutectic carbide in the form of grains or clusters. These features can only be obtained when a hot plastic forming is applied to castings at a specific temperature.

Although the previously pending claims are believed to be patentable over the cited art, the claims have been amended to change "alloy" to "member", with a specific purpose. In particular, a member that slides over another member. This further distinguishes the present invention over the alloys cited by the Examiner.

Ohriner et al and Dong et al disclose Co-free materials of a specific composition. This material, as defined by Ohriner et al, is a casting iron having a specific combination in which the eutectic carbide is diffused in a mesh-like

formation. According to Dong et al, the Co-free material is a wear-resisting welding material for a hard facing alloy or a wear-resisting casting alloy having a Ni-based alloy of a specific combination in which the eutectic carbide is diffused in a mesh-like formation.

None of these references disclose or suggest using the alloy member as a sliding member that slides over another member, in which the alloy is a Co-based alloy, Ni-based alloy or Fe-based alloy that is formed by hot plastic forming at a specific temperature. Instead, according to these references, wear-resistance of the base material is provided by deposit welding applied to the surface thereof. The deposit welding process produces a mesh-like eutectic carbide in the welding layer. The abrasion of this deposited welding layer leaves a projection of mesh-like formed eutectic carbide thereon and abrading movement causes these projections to break and detach. This detaching of these projections lower the wear-resistance of the material and the detached eutectic carbide damages the other member over which sliding is occurring.

On the other hand, according to the present invention, the eutectic carbide in an alloy is discontinuously distributed in the form of grains or clusters due to hot plastic forming providing a coefficient of friction as low as 0.1 to 0.5 with reduced abrasion in the alloy itself. Even if abrasion leaves a projection of eutectic carbide, the detaching thereof will not easily occur because of the eutectic carbide existing in the forms of grains or clusters. Therefore, the present invention realizes significant

advantages in the application of sliding motion of members and wear-resistance that are not realized in the prior art. Furthermore, by making the grain size of the eutectic carbide less than 30 μm, the alloy has even more enhanced wear-resistance.

Nakamura et al discloses a gas turbine nozzle with a Co-based casting alloy. However, Nakamura et al does not disclose or suggest using the member of the alloy as a sliding member which slides over another member. Also, Nakamura et al does not disclose that its alloy is formed by hot plastic forming at a specific temperature. Although the gas turbine nozzle of Nakamura et al would have a portion that may touch another member involved in a sliding movement, such portion is not intentionally used as a sliding member. As such, this portion is not a member that is designed to slide over another member. Furthermore, Nakamura et al is silent with respect to grain size of the eutectic carbide. Furthermore, Nakamura et al suffers from the drawbacks associated with mesh-like formations of eutectic carbide which will leave projections that break during abrading movement. As mentioned above, such detachment lowers the wear resistance of the material and damages other members over which a sliding action occurs. Nakamura et al is directed to an alloy that has a high tensile strength and elasticity at high temperature and is not applicable to the presently claimed invention.

Conclusion

In view of the foregoing, Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.

By ____________________
Shrinath Malur
Reg. No. 34,663
(703) 684-1120